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Explaining the Role of User Commitment in Extended Use of Information Systems: An Empirical Investigation

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EXPLAINING THE ROLE OF USER COMMITMENT IN EXTENDED USE OF INFORMATION SYSTEMS: AN EMPIRICAL INVESTIGATION

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Abstract

Post-adoptive usage behaviors of information systems (IS) are critical for a firm to successfully improve performance and sustain competitive advantages. As a form of post-adoptive usage, extended use is conscious behavior beyond routine that requires the extra involvement of users' time and efforts. Drawing upon the insights from the IS continuance model and organizational commitment theory, we developed a research model to investigate the role of user commitment in extended use of IS in this study. With the survey of 240 ERP users, our results indicated the important basis of IS continuance model for understanding post-adoptive extended use. We also found the different roles of commitment factors in explaining extended use. Specifically affective commitment influences extended use via user satisfaction; while continuous commitment has a direct effect on extended use. This study highlights that the integration of user commitment factors with IS continuance model contributes to better understanding post-adoptive extended use.

Keywords: Affective Commitment, Continuous Commitment, Extended Use, Post-adoptive Usage.

1 INTRODUCTION

In recent years, the investments in new information systems (IS) increase very rapidly. However, it has become more difficult for the firms that implement the systems to realize the promised return on investments in IS. An effective way to extract the promised value from information systems is to encourage employee users to enrich their use of adopted IS (Rai et al. 2002; Hsieh et al. forthcoming). In the IS discipline, research interest in post-adoptive usage has continued over the past decades given its importance for a firm to improve performance and sustain competitive advantages. Post-adoptive usage behaviors refer to individual users' technology usage after firms adopt and implement an IS (Saga & Zmud 1994), which include continuance, routine use, extended use, innovative use, and so on (Bhattacherjee 2001; Hsieh & Wang 2007; Wang et al. 2008). During the post-adoptive stage, continuous usage is the first step to realize the return from the adopted IS as promised. When employees know more about the adopted IS, system use gradually becomes spontaneous as the frequency of use increases and then routine use of the system becomes part of their work. However, in order to extract more value from the adopted IS, some employees may go beyond the management requirements to engage with more functional features of the system (Hsieh & Wang 2007; Hsieh et al. forthcoming). Such usage behavior, called extended use, occurs voluntarily. Following Hsieh and Wang (2007), extended use in this study refers to users learning and applying more of the available functions of the implemented IS to support their work.

IS continuance model (Bhattacherjee 2001) was widely used in explaining user behavior at the post-adoptive stage. However, extended use is a conscious behavior beyond continuance and routine, which requires users' strong involvement of time and efforts. Although a significant number of studies have focused on continuous use issue, whether their findings can be applied into other post-adoptive usage context requires further explorations. The relationships among different post-adoptive usage behaviors are very complex. Furthermore the effects of prior use on deep use at the post-adoptive stage are associated with many factors, such as habit, gender (Venkatesh et al. 2003), and satisfaction (Bhattacherjee 2001). Therefore, distinguishing extended use from routine continuance has significant implications for both research and practice. Specifically, how to drive users from continuance into extended use has become an important issue in IS field (Hsieh & Wang 2007). For practice, continuous use is an important step to extended use. Once users stop using an IS, extended use will be impossible. Given that extended use is a conscious behavior, without user commitment, this state of usage behavior is difficult to attain.

IS continuance model (Bhattacherjee 2001) proposed user satisfaction as the key to understand IS continuance, and two affective factors, i.e. perceived usefulness and confirmation of expectation from prior use, are the important determinants to user satisfaction. However, the IS continuance model has yet to accommodate the impact of non-affective elements on post-adoptive behavior. Although many researchers examined multiple new predictors of post-adoptive usage behaviors, they often focused on affective and utilitarian factors, without giving enough consideration of other elements such as commitment (Wang 2008). In addition, many studies (e.g., Li et al. 2006; Malhotra & Galletta 2005) have verified the importance of commitment in explaining the technology adoption or acceptance. However, the effect of users' commitment on their extended use of IS still remains unaddressed.

In order to bridge the above-mentioned research gap, we develop a research model in this study to investigate the role of user commitment in extended use of IS, drawing upon the insights from the IS continuance model (Bhattacherjee 2001) and the organizational commitment theory (Allen & Meyer 1990; 1996). We attempt to provide a new perspective to enrich the post-adoptive usage research and better understand the determinants of post adoptive extended use.

2 THEORETICAL FOUNDATIONS AND RESEARCH HYPOTHESES

2.1 IS Continuance Model

Continuance is defined as a form of post-adoption behaviors that follow initial acceptance (Bhattacherjee 2001). The IS continuance model (i.bid.) posits that a user's intention to continue use is determined primarily by his or her satisfaction with previous usage and perceived usefulness. In addition, user satisfaction is positively influenced by perceived usefulness, which is positively associated with confirmation of expectation. IS continuance model has been widely used to explain the usage behaviors in the post-adoption context, such as continuance, extended use and innovative use (Bhattacherjee et al. 2008; Hsieh & Wang 2007; Wang et al. 2008).

2.2 IS Commitment

Commitment refers to "a force that binds an individual to a course of action" (Meyer & Herscovitch 2001). It can be viewed as the psychological attachment felt by an individual in an organization and reflects the degree to which the individual internalizes or adopts characteristics or perspectives of the organization (Meyer & Herscovitch 2001). Commitment can be conceptualized in terms of three dimensions: affective, continuous, and normative (Allen & Meyer 1990). Accordingly, affective commitment is the identification with, involvement in, and emotional attachment to a relationship such as an employee-organization relationship. Continuous commitment, also termed as calculative commitment, reflects the fact that a person recognizes the costs associated with leaving a relationship and is thus concerned with a purely cognitive cost/benefit analysis of maintaining a relationship. Normative commitment explains moral obligations, social norms, and one's responsibility to the other party in a relationship. In short, affective commitment is a mindset of desire. Continuous commitment is a mindset of cost-avoidance, and normative commitment is a mindset of obligation.

Commitment has been introduced to other business fields, such as consumer behaviour (Bansal & Irving 2004) and workplace management (Meyer & Allen 1997). Some researchers (Li et al. 2006; Malhotra & Galletta 2005) have also introduced organizational commitment theory (Allen & Meyer 1990; 1996) into the IS discipline. Specifically, IS commitment is defined as an individual's psychological bond with an IS, which makes it less likely for the individual to voluntarily discontinue the use of the system (Wang 2008). Affective commitment refers to a users' sense of attachment to an information system driven by internal motivation and a sense of involvement and identification (Allen & Meyer 1996; Meyer et al. 2002; Wang 2008). Accordingly, continuous commitment is related to a users' sense of attachment to an information system driven by cost concerns about discontinuing the use of an IS and switching to an alternative IS. Normative commitment has its root in social exchange and norms. However, considering there is no exchange between human and information systems, normative commitment may be not relevant in the relationship between a user and an information system (Li et al. 2006; Wang 2008). As a result, normative commitment is not the focus of the current study. Integrating the above literature, the two-dimensional commitment model, viz., affective and continuous commitment, is regarded as the basis for IS post-adoptive usage research.

2.3 Research Hypotheses

Drawing upon the insights from the above IS continuance model and the two-dimensional commitment model, we develop a research model to investigate the role of user commitment in the extended use of IS in this study. Figure 1 depicts the relationship between IS continuance model and user commitment in explaining the extended use of IS.

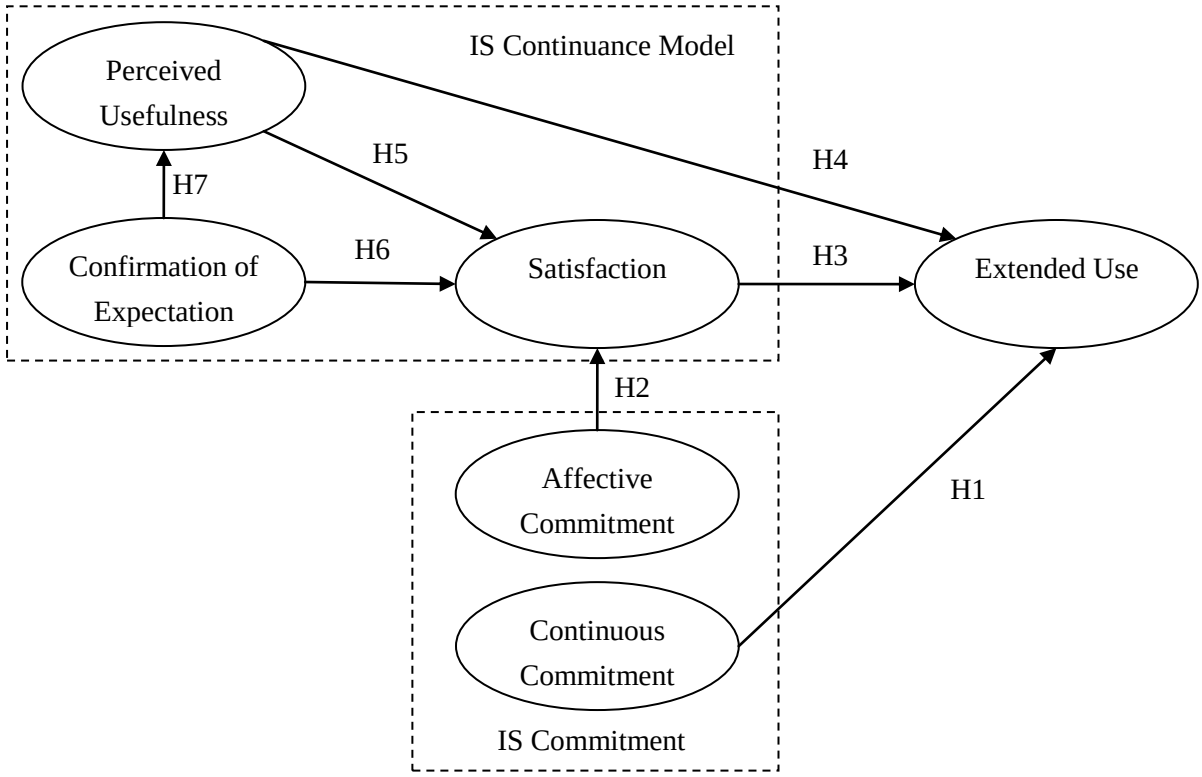

Figure 1.Research Model

Extended use is defined as a higher level usage behavior in which users learn and apply more of the available functions of the implemented technologies to support their work (Hsieh et al. forthcoming; Wang et al. 2008). Extended use occurs at the post-acceptance stage after the initial adoption, and more precisely, the stage beyond routine. Thus, extended use is a voluntary behavior of using the IS. Given that extended use is a kind of continuance behaviour, IS continuance model can serve as a basis to further investigate the phenomenon of extended use. At the same time, commitment is related to a variety of attitudinal and behavioral consequences among employees in an organization (Meyer & Allen 1997). Specifically, commitment is believed to be a good predictor of persistent behaviors (Wang 2008). Moreover, commitment can influence behavior independent of motivation and attitudes (Allen & Meyer 1990; Meyer & Herscovitch 2001). These studies suggest that commitment can provide a new perspective to explore the extended use of an IS.

Following Malhotra and Galletta (2005), user commitment in the present study is defined as the users' psychological attachment to IS use. There are two kinds of commitment relevant to the present study, viz., the commitment to a prior course of action and the commitment to a relationship (Li et al. 2006). The commitment to a course of action can be explained by side bet theory (Becker 1960) and cognitive dissonance theory (Festinger 1957). This kind of commitment, similar with calculative commitment, shows that people behave in a consistent way to avoid losing previous investments and to reduce internal cognitive conflict (Li et al. 2006). The commitment to a relationship explains an individual's positive attitude toward a social or business relationship and his/her motivation to remain in the relationship (Allen & Meyer 1996; Li et al. 2006). This kind of commitment can be explained by organizational commitment theory (Allen & Meyer 1990). Affective commitment, continuous commitment and normative commitment are three dimensions.

As introduced previously, extended use is a post-acceptance behavior that involves learning and using more of the functions available in the information system to make deeper use of the IS to support their work. Besides affective and utilitarian factors (Hsieh & Wang 2007), commitment can influence post-adoptive extended use when users desire for better performance from their prior IS investments. Here,

continuous commitment is defined as a situation in which an individual recognizes the rewards and benefits associated with continuing to use an adopted IS and maintaining a relationship with the system (Li et al. 2006). Continuous commitment is cognitively dependent on cost (Wang 2008). Continuous commitment occurs when a user recognizes that the costs associated with stopping his/her use of the system are higher than rewards. These costs involve financial and non-financial elements such as opportunity costs, learning curves, sunk costs, and so on. Since enterprise information systems such as enterprise resource planning (ERP) or customer relationship management (CRM) are normally complex, employee users have to invest much time and efforts to learn. Such investments will be lost if employee users stop using the adopted system. As a result, a user's investment will serve as a powerful psychological inducement to maintain a relationship with the system. From this perspective, it is reasonable to believe that these users are more likely to extend the scope of the functions that they use through post-adoptive learning to support their work performance in order to increase their rewards from the adopted system. Therefore, the following hypothesis is proposed.

H1*: A user's continuous commitment contributes to his/her extended use of an IS.*

In terms of explaining post-adoptive extended use, the role of affective commitment may be different from continuous commitment. Satisfaction is an experience-based affect reflecting users' overall feeling about their interaction with an IS (Bhattacherjee 2001). In this study, affective commitment is defined as a situation in which an individual demonstrates an affective and emotional attachment to the relationship with system use (Li et al. 2006). Given their psychological attachment, system users feel and believe that the use of the adopted information system is the right thing. Therefore, these users are more likely to satisfy with the system use. Hence, the link between affective commitment and satisfaction is created.

H2*: A user's affective commitment contributes to user satisfaction*.

For employee users who try to learn and apply more functions about an enterprise system, their satisfaction can serve as an affective precondition of their post-adoptive behaviors. If employees are satisfied with their direct use of the system, they are more likely to embrace it, accept it, and even extend the scope of the functions which they use through learning and doing.

H3*: User satisfaction contributes to his/her extended use of an IS.*

Perceived usefulness motivates individual usage behavior because of its instrumental consideration (Bhattacherjee 2001). Perceived usefulness at the post-acceptance stage is formed mostly through users' own first-hand experience and is therefore more reliable. For those employee users to extend more functions of the adopted enterprise system to support their task performance, their evaluation of the utility of the system use represents the logical and rationale assessment including the assessment of whether their time and effort is paying off. In this vein, the higher level of perceived usefulness of the system, the more likely they will learn and use more of the functions available in the IS.

H4*: Perceived usefulness of an IS contributes to its extended use.*

Previous studies have also revealed that perceived usefulness of an IS impacts individuals' affects substantively across the acceptance and post-acceptance stages. Satisfaction can be conceived as an individual affect at the post-acceptance stage. As perceived usefulness influences attitude affect during the acceptance stage, perceived usefulness is expected to be the salient ex post expectation that influences satisfaction affect at the post acceptance stage.

H5*: Perceived usefulness of an IS contributes to user satisfaction.*

Following the IS continuance theory, confirmation of expectation is defined as the extent to which expectation is confirmed (Bhattacherjee 2001). It provides the baseline level against which users can assess the confirmation of their expectation to determine their satisfaction. In contrast, disconfirmation occurs when actual performance is lower than expected performance. Confirmation of expectation implies realization of the expected benefits of an IS use, thus confirmation is positively related to satisfaction with the system use.

***H6**: A user's confirmation of expectation on an IS is positively associated with his/her satisfaction with the IS.*

At first, users often have their expectation from IS use, and gradually adjust it after the direct interaction with the system. Such perceptions about IS use may be adjusted higher as they know more about the system and accumulate experience about the system use. Nevertheless, users may experience cognitive dissonance if their actual usage is inconsistent with their expectation. Users often possess the tendency to adjust their perceptions to be consistent with reality. Hence,

***H7**: A user's confirmation of expectation on an IS contributes to its perceived usefulness.*

3 RESEARCH METHOD

We adapted the existing measures for all variables used in this study. Specifically, items for extended use were from Hsieh and Wang (2007). Affective commitment and continuous commitment were measured based on the items from Li et al. (2006), and Allen and Meyer (1990), respectively. Perceived usefulness, confirmation of expectation, and satisfaction were measured based on the study of Bhattacherjee (2001).

A survey within a cross-sectional field study was used to collect the data and test the research model. Given our research attention on extended use of complex IS in organizational contexts, we focus the investigation on the usage of ERP systems. Furthermore, since an ERP system can help organizations incorporate their complete range of business activities into single an information technology infrastructure, various departments within an organization can share information and communicate with each other. Therefore, its successful deployment and effective use are critical to organizational performance. Given that a large number of the firms have adopted ERP systems in the Chinese manufacturing industry, how to realize the benefits from the ERP system is the common interest of the adopted firms. This study chose a large company, one of Top 500 firms in China, as the research site. The company was located in Guangzhou, the capital of Guangdong Province, China. The firm was chosen for its successful implementation, as affirmed by the vendor, and has used the ERP packages for 10 years.

Dimension	**Category**	**Percentage (%)**
Education	Junior High School or Lower	2.9
	High School	17.9
	College	38.3
	Bachelor	37.6
	Master or above	3.3
Age	23-29 years old	35.0
	30-39 years old	43.4
	40-49 years old	20.4
	50 years old or older	1.2
Gender	Male	54.2
	Female	45.8
Working Department	Accounting & Finance	10.4
	Marketing	7.5
	Production	38.3
	Human Resource Management	1.7
	Others	42.1

Table 1. Demographics of the Survey Respondents

The official field survey was administered to ERP users in the large manufacturing company in Guangzhou. After interviews with information managers in the company, the revised questionnaires were further distributed to knowledge workers who use ERP systems to support their work. Different from front-line workers who routinely use ERP for simple input and output application, the targeted knowledge workers had the discretion for function extension in their work. To ensure the representativeness of the participants, a random selection process was performed to identify 255 employee ERP users across different departments in the firm. With the full support of the CEO and CIO, survey instruments were distributed to 255 employee ERP users, 240 survey questionnaires were returned. The response rate was 94.1%. Table 1 presents the demographic characteristics of the survey respondents.

4 DATA ANALYSIS

Structural equation modeling (SEM), specifically AMOS 17.0, was used for the data analysis. It is a multivariate technique that combines aspects of multiple regression and factor analysis to estimate a series of interrelated dependence relationships simultaneously (Hair et al. 1998). That is, two-step data analysis was done to first assess the measurement model and then test the hypotheses by fitting the structural model.

4.1 Measurement Model

The measurement model was evaluated prior to the structural model, in terms of construct reliability, unidimensionality, convergent validity, and discriminant validity. The model includes six constructs with 20 items. Table 2 shows the descriptive statistics of the constructs.

Construct	**Mean**	**S.D.**
Affective Commitment (AC)	4.49	1.15
Continuous Commitment (CC)	4.62	1.27
Confirmation of Expectation (COE)	4.93	1.15
Perceived Usefulness(PU)	5.29	1.03
Satisfaction (SAT)	4.72	1.19
Extended Use (EU)	5.30	1.21
Notes: All constructs are seven-point scales with the anchors 1=strongly disagree, 4=neutral, and 7=strongly agree		

Table 2.Descriptive Statistics

Internal consistency, convergent validity, and discriminant validity were further evaluated by examining the Cronbach's alpha, composite reliability, and average variance extracted (AVE) of each construct. Table 3 shows the standardized loadings and reliabilities of the latent constructs in the model. All the item loadings are greater than the criterion 0.70 except for AC1 (0.63), which is slightly lower than this criterion. All the estimated standard loadings in the model were significant ($p<0.01$). The values of Cronbach's alpha and composite reliabilities were all greater than 0.707 (Nunnally & Bernstein 1994). In addition, the AVE for each construct was higher than 0.50, suggesting that observed items explain more variance than the error terms (Fornell & Larcker 1981). Unidimensionality was also supported by AVE higher than 0.50 and composite reliabilities higher than 0.70 (Segers 1997).

Latent Construct	Indicator	Standard loading	Cronbach's α	Composite reliability	Average variance extracted
Affective commitment (AC)	AC1 AC2 AC3	0.63^{***} 0.79^{***} 0.91^{***}	0.82	0.89	0.73
Continuous Commitment (CC)	CC1 CC2 CC3	0.78^{***} 0.88^{***} 0.73^{***}	0.83	0.90	0.75
Confirmation of Expectation (COE)	COE1 COE2 COE3	0.90^{***} 0.93^{***} 0.88^{***}	0.93	0.95	0.87
Perceived Usefulness (PU)	PU1 PU2 PU3 PU4	0.86^{***} 0.90^{***} 0.93^{***} 0.93^{***}	0.95	0.96	0.86
Satisfaction (SAT)	SAT1 SAT2 SAT3 SAT4	0.86^{***} 0.95^{***} 0.92^{***} 0.94^{***}	0.96	0.97	0.88
Extended Use (EU)	EU1 EU2 EU3	0.81^{***} 0.85^{***} 0.92^{***}	0.89	0.93	0.82

$^{***}p < 0.01$

Table 3.Confirmatory factor analysis

Discriminant validity is the degree to which items differentiate between constructs, or measure different constructs. Discriminant validity can be assessed by comparing the shared variance between constructs with the average variance extracted from the individual constructs. In the measurement model, the square root of AVE of a construct was higher than its correlations with other constructs. The results in Table 4 suggest good discriminant validity.

Construct	AC	CC	COE	PU	SAT	EU
AC	**0.86**					
CC	0.64	**0.86**				
COE	0.68	0.53	**0.93**			
PU	0.62	0.60	0.80	**0.93**		
SAT	0.69	0.63	0.80	0.75	**0.94**	
EU	0.64	0.52	0.59	0.60	0.65	**0.91**

Note: The bold numbers on the diagonal are the square root of the variance shared between the constructs and their measures. Off-diagonal elements are correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

Table 4.Discriminant Validity

4.2 Structural Model

After verifying the measurement model, we then proceeded to examine the structural model fit. The overall goodness-of-fit was examined using the following six common model fit measures, viz., chi-square/degree of freedom, GFI, AGFI, CFI, SRMR and RMSEA. As shown in Table 5, the ratio of χ^2 to the degree of freedom (2.88) is within the acceptable limit. RMSEA (0.089) was close to the recommended 0.08 (Browne & Cudeck 1993). Except for GFI (0.84), and AGFI (0.79), which are slightly lower than the commonly cited thresholds, all other indices are within accepted thresholds, i.e., CFI at 0.98, TLI at 0.98, and SRMR at 0.064. Meanwhile, Hu and Bentler (1999) proposed a strict combination rule: (1) SRMR<0.08 and (2) either CFI>0.95 or RMSEA<0.06. Results in Table 5 show that indices of the structural model comply with the combination rule, e.g. SRMR (0.064)<0.08 and CFI (0.98)>0.95, further supporting the model fit between the structural model and data.

GFIs	Structural model	Desired levels
χ^2/df	2.88	< 3.0
CFI	0.98	> 0.90
TLI	0.98	> 0.90
RMSEA	0.089	< 0.08
Standardized RMR	0.064	< 0.08
GFI	0.84	> 0.90
AGFI	0.79	> 0.80

Table 5.Fit indices of structural model

We then tested the research hypotheses. Figure 2 illustrates the path coefficients and explanatory power for the resulting model. The results suggest that the model was able to explain 51 percent of the variance in employee users' extended use of IS. Furthermore, 75 percent of the observed variance in satisfaction, and 71 percent of the variance in perceived usefulness have been explained in this model.

Specifically, the extended use of an IS was predicted by user satisfaction (β=0.44), perceived usefulness (β=0.20), and continuous commitment (β=0.16). In addition to its direct effect, perceived usefulness also indirectly influenced extended use (β=0.062) [1] via user satisfaction. Meanwhile, user satisfaction was affected by confirmation of expectation (β=0.51), affective commitment (β=0.29), and perceived usefulness (β=0.14). In addition, confirmation of expectation also indirect influenced user satisfaction (β=0.12) via perceived usefulness. These three factors, e.g. confirmation of expectation, affective commitment, and perceived usefulness jointly accounted for 75% of the variance in user satisfaction. Perceived usefulness was affected by confirmation of expectation (β=0.84), which explained 71% of the variance in perceived usefulness.

All the seven hypotheses in the proposed research model were supported. We found that IS continuance model was a good basis for understanding employee users' post-adoptive extended use of information systems (H3, H4, H5, H6 and H7). Compared with perceived usefulness (β=0.20), user satisfaction (β=0.44) was the stronger predictor of extended use. In addition, this study verified the important role of IS commitment in explaining extended use. The effect of continuous commitment on extended use was significant (H1). However, the effect of affective commitment on extended use is indirectly through user satisfaction (H2, H3).

[1] If an antecedent (e.g., perceived usefulness) influenced extended use via a mediating factor (satisfaction), its overall impact on extended use was calculated as the cross-product of its impact on the mediator (β (perceived usefulness→satisfaction)) and the impact of the mediator on extended use (β (satisfaction→extended use)).

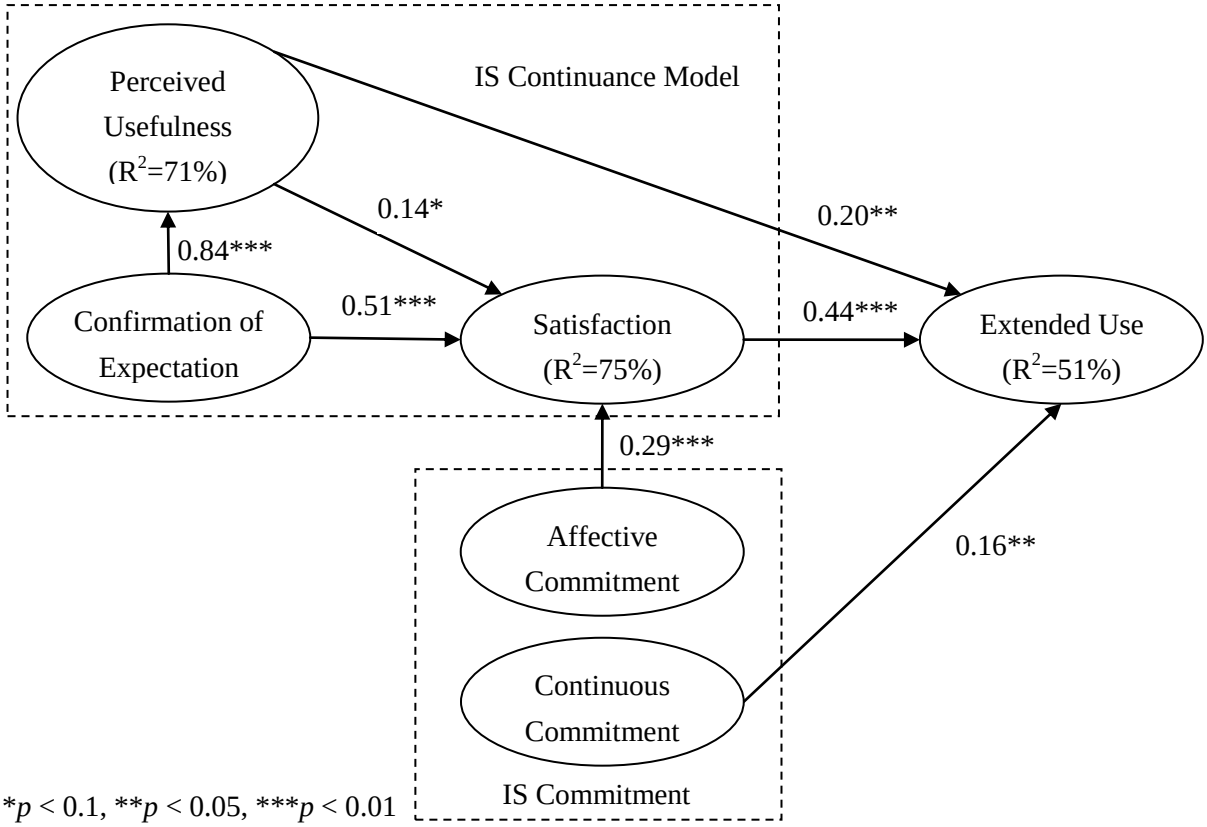

Figure 2.Research Model

5 DISCUSSIONS

The primary objective of this study was to examine the effects of user commitment in explaining extended use of information systems. The research results indicate that all the seven causal links specified by the model were supported. Specifically, user satisfaction, perceived usefulness, and continuous commitment collectively explained 51% of the variance in extended use, which is higher than 43% explained variance in the synthesized model of Hsieh and Wang (2007). The synthesized model of extended use was proposed by Hsieh and Wang (2007) through the integration of Technology Acceptance Model (TAM) and IS Continuance Model. Compared with TAM and IS Continuance Model, the synthesized model of Hsieh and Wang (2007) was found to have a better explanation for extended use. Based on IS Continuance Model, the present study added the perspective of IS commitment to propose a IS Commitment Model of Post-Adoptive Extended Use, which model explained more variances in extended use than the above-mentioned models. The addition of IS commitment is an important reason for the enhancement of the explanatory power in the present study, as verified theoretically and empirically.

In this study, we found that user satisfaction had the strongest influence on extended use compared with perceived usefulness and continuous commitment. This is inconsistent with Hsieh & Wang's synthesized model, but consistent with IS Continuance model in the study of Hsieh and Wang (2007). Although user satisfaction significantly influenced extended use in the IS Continuance model, it exerted little impact in the synthesized model. The reason behind may lie in the introduction of the construct of perceived ease of use, which marginalized the effect of satisfaction (Hsieh & Wang 2007). This point has been supported in the present study.

We also found that perceived usefulness was significant in explaining extended use of IS, consistent with previous literature (Hsieh & Wang 2007). This reflected that the IS instrumentality motivated users to extend the system functions to support their work. Thus, perceived usefulness should be

considered in future extended use research of information systems. Furthermore, this study found that user satisfaction was affected by perceived usefulness and confirmation of expectation, and perceived usefulness was influenced directly by confirmation of expectation, consistent with the relationships in IS continuance model. The findings indicated that IS continuance model can be a good basis in investigating post-adoptive extended use of IS.

In addition, the present study provided a good perspective with addition of IS commitment into IS continuance model in explaining extended use. The results indicated that the two dimensions of IS commitment play different roles in affecting extended use. Continuous commitment directly affected IS usage behavior, while affective commitment directly influenced users' affect of the IS usage. The results were not fully consistent with the previous studies (e.g. Li et al. 2006), where affective commitment and continuous commitment had the associations with behavior and the influence of affective commitment was stronger. The reason why there is an insignificant effect of affective commitment on extended use may result from the characteristics of the study sample and information technology. Our research sample were knowledge workers who use ERP systems in a large manufacturing firm, while Li et al. (2006) used college students using e-commerce web site to purchase something as their study sample. It was not surprising for the inconsistent finding. ERP systems are rather complex, which requires users to invest many resources and efforts to learn how to use. However, web site users do not need to do the same thing because a standard browser at the client side is adequate for starting to use a web site. Therefore, in the present study, continuous commitment directly influences extended use, while an affective and emotional attachment to the relationship with system use are more likely to associate with user satisfaction.

6 CONCLUSIONS

6.1 Limitations

There are several limitations of the study that are worth mentioning. First, a notable weakness lies in the cross-sectional research design, where all measurement items were collected at the same point of time. We know that the investigated constructs are not supposed to remain unchanged over time, thus this research method may not fully capture the dynamics of the extended use phenomenon. Also, this research employs only one method for data collection and may thus be subject to the common-method bias. To solve the above two limitations, future research should consider a process-oriented perspective with a longitudinal research design and collect both qualitative and quantitative data to further verify the current research model.

Second, self-reported measurement of the extended use construct may be different from the actual use. Therefore, cautions should be exercised when interpreting the results of this research. Future research should monitor the actual number of features used, and then examine the relationships in this research. Finally, this study did not investigate other types of commitment, such as normative commitment. Future research can also further investigate this direction.

6.2 Implications for Research

From a theoretical perspective, the current research has implications for the post-adoptive usage behaviors of IS. First, this research is one of the pioneer studies that introduce commitment theories to explain post-adoptive extended use. Our commitment-based research model provides a useful framework for future studies on post-adoptive extended use of IS. In addition, this study showed the important role of two different dimensions of commitment. Continuous commitment directly affected extended use, while affective commitment indirectly influenced extended use via user satisfaction. Thus, the current research implies that future research should consider the different dimensions of commitment rather than confining its conceptualization to a unidimensional construct.

Second, the theoretical framework of the present research focused on factors such as technology attributes and personal affect. However, other perspectives such as organizational, managerial, and social factors can also influence system usage (Gallivan 2001). These factors could influence post-

adoptive extended use through managerial measures to change employees' psychological attachment to an adopted IS in an organization. The untapped organizational complexity may influence extended use, and thus needs further exploration.

Third, from the process perspective of IS use, users' extended use of IS is based on a series of decisions that binds the individual to his previous line of actions. During this series of decisions, a commitment to the implemented IS emerge as a psychological bond to maintain the relationship between users and the IS. Extended use, as one advanced use behavior, describes use of more features to support individual task performance. The nature of extended use is theoretically distinct from the often studied use concepts, such as continuance and routine use. Extended use concerns using a wider range of functionalities for work productivity and is expected to take place during the post-adoption stage. Traditional concepts such as continuance and routine use can not explicitly capture this notion. The addition of commitment factors has made a good extension to IS continuance model (Bhattacherjee 2001). Therefore, this research provides a strong theoretical base for the future research on extended use of IS.

6.3 Implications for Practice

Our findings also have important managerial implications for the firms that have already implemented enterprise IS. Given the positive link between post-adoptive usage behaviors and the employee users' performance outcomes, post-adoptive usage behavior has received much attention from research and practice. Once IS have been successfully implemented and utilized on a regular basis in a firm, managers can shift their attention beyond routine use and encourage such higher-level usage behavior as extended use. It is noted that continuous use is an important step to extended use. Continuous use can provide a necessary context for users to go into the high level of extended use. As a result, managers should pay more attention to help employee users continue using the adopted IS. In addition, extended use is a conscious behavior, without user commitment, this state of usage behavior may be difficult to attain. Therefore, managers should focus on the development of IS commitment and facilitate its influence on post-adoptive extended use of IS.

Extended use is a voluntary behavior, which reflects whether employees identify with the adopted IS and are willing to learn and utilize more of the available functions to support their work. The more an employee user has invested in an already-implemented information system, the higher level of extended use he/she will attain. From this point, managers should take measures (e.g. providing more training activities) for the IS users to increase their efforts in learning the adopted IS, thus helping them smoothly go to post-adoptive extended use of IS. In addition, employee users' affective commitment influenced post-adoptive extended use via user satisfaction. This reflected that emotional bond with an IS can increase an employee user's positive affect with the system use. Therefore, managers should acknowledge the importance of how to develop a high level of affective commitment toward the adopted information system.

In sum, extended use is a higher level volitional usage behavior which is beyond routine. Such usage behavior can potentially lead to better results and returns. Both research and practice have recognized the importance of realization of user commitment to volitional system use. Therefore, drawing upon the IS continuance model and organizational commitment model, this study develops a research model to examine how user commitment affects extended use and provides a good direction for the extension of IS continuance model. Future research should consider the important role of user commitment in investigating the post-adoptive extended use phenomenon.

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